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LATHAM & WATKINS LLP

April 13, 2018

VIA EDGAR AND HAND DELIVERY

Mr. Chris Edwards
Office of Healthcare & Insurance
United States Securities and Exchange Commission
100 F Street, N.E.
Washington, D.C. 20549

Re: Evelo Biosciences, Inc. Registration Statement on Form S-1 (CIK No. 0001694665)

Dear Mr. Edwards:

On behalf of Evelo Biosciences, Inc., a Delaware corporation (the "***Company***"), we are transmitting this letter in response to comments received from the staff (the "***Staff***") of the Securities and Exchange Commission (the "***Commission***") by letter dated April 3, 2018 with respect to the Company's draft Registration Statement on Form S-1 confidentially submitted on March 5, 2018 (the "***Initial Confidential Registration Statement***"). This letter is being submitted together with the Company's Registration Statement on Form S-1 filed on April 13, 2018 (the "***Registration Statement***"). The bold and numbered paragraphs below correspond to the numbered paragraphs in the Staff's letter and are followed by the Company's responses. For the Staff's convenience, we are also sending, by courier, copies of this letter and marked copies of the Registration Statement that reflect changes made to the Initial Confidential Registration Statement.

Overview, page 1

1. **Please balance the statement that you are pioneering the development of therapies designed to act on the gut-body network with the fact that you have not initiated clinical trials for any product candidate.**

Response: In response to the Staff's comment, the Company has revised the disclosure on pages 1, 2, 3, 66, 85, 87 and 90 of the Registration Statement.

2. **Given that you have not yet begun the clinical testing that would serve to establish safety and efficacy for purposes of regulatory approval, it is premature to suggest that a preclinical candidate is safe or effective. Please revise the third paragraph, and elsewhere as appropriate, accordingly.**

   Response: In response to the Staff's comment, the Company has revised the disclosure on pages 1, 2, 4, 66, 85, 90, 92, 94, 95, 96, 104 and 105 of the Registration Statement.

3. **Please revise the table of clinical product candidates to indicate the three phases of clinical development that must occur prior to regulatory approval and commercialization, and that EDP1066, EDP1815 and EDP1503 have not commenced Phase 1 clinical trials.**

   Response: In response to the Staff's comment, the Company has revised the disclosure on pages 3, 86 and 93 of the Registration Statement.

4. **Please revise the table on pages 3, 86 and 93 to remove the programs relating to Rheumatoid Arthritis, Ulcerative Colitis/Crohn's Disease, Colorectal Cancer and Renal Cell Carcinoma. Because you have not identified a product candidate for these programs, it is premature to include them in a table of clinical product candidates. Please also remove the line items for Therapeutic Areas with Preclinical Data and Additional Therapeutics Areas, which appear to be in the discovery phase.**

   Response: In response to the Staff's comment, the Company has revised the disclosure on pages 3, 86, 93 and 94 of the Registration Statement.

   Furthermore, since our Initial Confidential Registration Statement, the Company nominated product candidates for the full set of clinical trials that are planned for 2018-2020. EDP1503 will be the product candidate that we take into all proposed oncology trials. The Company's inflammatory bowel disease trial will test EDP1066, and our rheumatoid arthritis trial will test EDP1815. We have updated the relevant text in the prospectus to reflect these nominations.

5. **Please revise the product candidate table to disclose that you expect to conduct the trials for EDP1066 and EDP1815 in the United Kingdom and whether you expect there to be any limitations to using the trial results for approval by the FDA since the trials are being conducted outside of the United States.**

   Response: In response to the Staff's comment, the Company has revised the disclosure on pages 3, 86 and 93 of the Registration Statement.

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Risk Factors, page 4

6. Please revise the third bullet point to clarify that you are in the pre-clinical stages of drug development and that you have not initiated clinical studies for any of your products.

Response: In response to the Staff's comment, the Company has revised the disclosure on page 4 of the Registration Statement.

Implications of Being an Emerging Growth Company, page 5

7. Please supplementally provide us with copies of all written communications, as defined in Rule 405 under the Securities Act, that you, or anyone authorized to do so on your behalf, present to potential investors in reliance on Section 5(d) of the Securities Act, whether or not they retain copies of the communications.

Response: The Company respectfully advises the Staff that it will provide copies of the written communications, as defined in Rule 405 under the Securities Act, that it uses in meetings with potential investors in reliance on Section 5(d) of the Securities Act on a supplemental basis. Such materials will only be made available for viewing by such investors during the Company's presentation. Pursuant to Rule 418 under the Securities Act, such copies shall not be deemed to be filed with, or a part of or included in, the Registration Statement. Additionally, pursuant to Rule 418(b) under the Securities Act, the Company will request that the Staff return copies of such materials to the Company. Other than these materials, the Company will not provide, and will not authorize any person to provide, any written materials in reliance on Section 5(d) of the Securities Act. The Company will undertake to provide the Staff with copies of any additional written communications that are presented to potential investors by it or anyone authorized to do so on its behalf in reliance on Section 5(d) of the Securities Act, whether or not such potential investors retain copies of the communications.

Risk Factors

Risks Related to Our Common Stock and this Offering

Provisions in our related certificate of incorporation…, page 52

8. We note your reference on page 53 to the provision in your certificate of incorporation that establishes an exclusive forum for legal actions brought by your shareholders. Please expand your disclosure as to the risks associated with this provision and highlight in a separate caption.

Response: In response to the Staff's comment, the Company has revised the disclosure on page 53 of the Registration Statement.

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Use of Proceeds, page 57

9. Please amend your disclosure to indicate how far the allocations set forth in this section will advance EDP1066 and EDP1815 in the inflammatory disease program and EDP1503 in the oncology program. To the extent that the proceeds from the offering will not be sufficient to fund the proof of concept trials specified in this section to completion, please revise the disclosure to make this clear.

Response: In response to the Staff's comment, the Company has revised the disclosure on page 57 of the Registration Statement.

Manufacturing, page 110

10. Please expand your disclosure to describe in greater detail the aspects of your manufacturing process that "potentially provide a distinct competitive advantage." Clarify the significance of Figure 20 on page 111 and explain what you mean by "increas[ing] yield by four logs." Explain how your fermentation system "enables rapid process optimization" compared to the standard process and briefly describe how you optimized this process "across several parameters."

Response: In response to the Staff's comment, the Company has revised the disclosure on pages 91, 111, 112 and 117 of the Registration Statement.

Intellectual Property

Patent Portfolio, page 112

11. Please expand your disclosure of your patents to discuss the type of patent protection you have (e.g., composition of matter, use or process).

Response: In response to the Staff's comment, the Company has revised the disclosure on pages 113 and 114 of the Registration Statement.

License Agreements, page 114

12. Please describe the material terms of the license agreement with the Mayo Clinic entered in June 2016 that is discussed in Note 8 on page F-17 of the consolidated financial statements or provide the basis for why such disclosure is not required. If the June 2016 agreement was not replaced by the August 2017 agreement, please also file the 2016 agreement as an exhibit or tell us why it is not required to be filed.

Response: The Company acknowledges the Staff's comment and respectfully advises the Staff that the license agreement with Mayo Clinic entered in June 2016 (the "2016 Mayo Agreement") is not material to the Company. The 2016 Mayo Agreement is not

connected to or associated with the Patent License Agreement between Mayo Foundation for Medical Education and Research and the Company entered into in August 2017 and filed as Exhibit 10.15 to the Initial Draft Registration Statement.

The Company entered into the 2016 Mayo Agreement to obtain biospecimens from cancer patients from which they planned to isolate microbial strains in order to grow their microbial library and, shortly following the signing of the 2016 Mayo Agreement, the Company pivoted away from the type of research the 2016 Mayo Agreement was intended to cover. The Company completed two small research projects under the 2016 Mayo Agreement, which were completed in 2017, and will not be initiating any additional projects. Pursuant to the 2016 Mayo Agreement, Mayo Clinic merely provided biospecimens for early research purposes. The results of research activities performed under the 2016 Mayo Agreement are owned by the Company. The research projects completed under the 2016 Mayo Agreement did not result in any product or platform intellectual property, nor did the projects result in any microbial strains or additions to the Company's microbial library.

Because there are no active research projects under the 2016 Mayo Agreement, the agreement will expire in June 2021. The Company has issued equity to Mayo Clinic pursuant to the 2016 Mayo Agreement, but has neither paid any amounts nor has any continuing financial obligation to Mayo Clinic. Mayo Clinic has no payment obligations to the Company under the 2016 Mayo Agreement.

The Company is discovering and developing potential therapies designed to act on the gut-body network. The results of the activities under the 2016 Mayo Agreement are not expected to be used by the Company to identify or develop any product candidates, and the Company is not dependent on the agreement to develop any of its product candidates or for any other aspects of its business. For the foregoing reasons, the Company has concluded that the 2016 Mayo Agreement is not required to be filed as an exhibit to its Registration Statement or any other filing, as it is not material to the Company and the Company is not "substantially dependent" on the 2016 Mayo Agreement within the meaning of Item 601(b)(10) of Regulation S-K. In addition, since the 2016 Mayo Agreement is not material to the Company, the Company does not believe that disclosing the material terms of the 2016 Mayo Agreement is required or useful for investors and respectfully asks the Commission to reconsider its request that the Company disclose the material terms of the 2016 Mayo Agreement.

University of Chicago License Agreement, page 114

13. Please revise your description to disclose the specific number of years from first commercial sale you will be required to make royalty payments under the agreement.

Response: In response to the Staff's comment, the Company has revised the disclosure on page 115 of the Registration Statement.

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General

14. Please provide us proofs of all graphics, visual, or photographic information you will provide in the printed prospectus prior to its use, for example in a preliminary prospectus. Please note that we may have comments regarding this material.

Response: The Company does not currently intend to include any additional graphic, visual or photographic information in the prospectus aside from the table of clinical product candidates, which has been added on pages 3, 86 and 93 of the Registration Statement. However, if and to the extent that additional artwork or graphics are to be included, the Company will promptly provide such material to the Staff on a supplemental basis. The Company acknowledges that the Staff may have further comments on these materials once they are provided.

15. We note that you have requested confidential treatment for agreements that are filed as exhibits to the registration statement. We will send any comments on your application for confidential treatment under separate cover.

Response: The Company acknowledges the Staff's comment.

If you have any questions regarding the foregoing responses or the enclosed Registration Statement, please do not hesitate to contact me by telephone at (617) 948-6060.

Very truly yours,

/s/ Peter N. Handrinos

Peter N. Handrinos
of LATHAM & WATKINS LLP

cc: Balkrishan (Simba) Gill, Ph.D., Evelo Biosciences, Inc.
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